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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/052,718	01/17/2002	Suhas Shetty	005657.P002	1417

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EXAMINER

BAKER, PAUL A

ART UNIT	PAPER NUMBER
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2188

DATE MAILED: 03/23/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/052,718

Applicant(s)

SHETTY ET AL.

Examiner

Paul A Baker

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 January 2002.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 38-60 is/are allowed.
- 6) ☒ Claim(s) 1-3, 8, 9, 15, 16, 19-23, 61, 62, 65, 66, 69 and 70 is/are rejected.
- 7) ☒ Claim(s) 4-7, 10-14, 17, 18, 24-37, 63, 64, 67, 68 and 71 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 5/9/2002
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 8-9, 15, 69 and 70 are rejected under 35 U.S.C. 102(e) as being anticipated by Larson, US Patent 6,115,705.

In regards to claim 8, Larson discloses a method comprising:

rotating entries stored in a plurality of locations of a hash bucket to empty a first location; and

adding a key to the first location of the plurality of locations of the hash bucket in figures 4 and 5 Bucket 0,5 and Bucket 2,7 entries 60 and 77 are rotated leftward and entries 75 and 57 are added.

In regards to claim 9, Larson discloses the rotating the entries comprises moving an entry from a location to a next location of the plurality of locations, in figures 4 and 5

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by sliding the oldest entry to the right rather than replacing the oldest entry with the newest entry.

In regards to claim 15, Larson discloses the rotating entries comprises placing a second to a most recent added entry in a second location and a least recent entry from entries remaining in the hash bucket in a last location, in figures 4 and 5, in Lawson's disclosure the second most recent added entry is also the least recent entry from the entries remaining.

In regards to claim 69, Larson discloses a machine-readable medium that provides instructions which when executed by a machine, cause the machine to perform operations comprising:

rotating entries stored in a plurality of locations of a hash bucket to empty a first location; and

adding a key to the first location of the plurality of locations of the hash bucket in figures 4 and 5 Bucket 0,5 and Bucket 2,7 entries 60 and 77 are rotated leftward and entries 75 and 57 are added.

In regards to claim 70, Larson discloses the rotating the entries comprises moving an entry from a location to a next location of the plurality of locations, in figures 4 and 5 by sliding the oldest entry to the right rather than replacing the oldest entry with the newest entry.

Claims 16 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Nemes, US Patent 5,893,120.

In regards to claim 16, Nemes discloses a method comprising:

- receiving a unique key to be deleted in appendix delete procedure function argument;
- searching a plurality of locations of a hash bucket for a match to the unique key in appendix delete procedure search_table function call (6th line of delete procedure);
- deleting the unique key from a location of the plurality of locations in the hash bucket upon finding the match to the unique key in the location in appendix delete procedure remove function call (8th line of delete procedure); and
- rotating remaining entries of the hash bucket after the deleting the unique key from the location of the plurality of locations in the hash bucket in appendix remove procedure if...end block (lines 10-14 of function).

In regards to claim 19, Nemes discloses the rotating the remaining entries of the hash bucket comprises shifting entries in locations following a deleted unique key location to place an entry stored in a location next to the deleted unique key location into the deleted unique key location in appendix remove procedure if...end block (lines 10-14 of function).

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Claims 20 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Kass, US Patent 5,566,324,

In regards to claim 20, Kass discloses a method comprising:
associating an entry of a plurality of entries in a cache with a timestamp in column 4 lines 51-53;
incrementing the timestamp in column 4 lines 59-62; and
deleting the entry of the plurality of entries in the cache based on a value of the timestamp in column 4 line 63 through column 5 line 3.

In regards to claim 21, Kass discloses the deleting the entry of the plurality of entries in the cache is performed upon the timestamp reaching a predetermined maximum value in column 4 line 63 through column 5 line 3.

Claims 20 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by Bogin et al., US Patent 6,658,533.

In regards to claim 20, Bogin discloses a method comprising:
associating an entry of a plurality of entries in a cache with a timestamp in column 5 lines 48-50;
incrementing the timestamp in column 5 lines 50-51; and

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deleting the entry of the plurality of entries in the cache based on a value of the timestamp in column 5 lines 56-59.

In regards to claim 22, Bogin discloses the deleting the entry of the plurality of entries in the cache is performed when the timestamp is greater than timestamps of remaining entries of the plurality of entries and a number of total entries in the cache is equal to a predetermined maximum number of entries in column 5 lines 56-59.

Claim 23 is rejected under 35 U.S.C. 102(e) as being anticipated by Huang et al., US Patent 6,683,887.

In regards to claim 23, Huang discloses a method comprising:

identifying a subscriber associated with a particular packet utilizing a line card;
and

transmitting the particular packet to one of a plurality of data cards associated with the identified subscriber in column 7 line 64 through column 8 line 9. Here the examiner is interpreting Huang's ADSL line unit to be equivalent to applicant's line card and Huang's ADSL modems to be equivalent to applicant's data cards.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

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invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 61-62, 65 and 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spinney et al. US Patent 5,390,173 in view of Handy "The Cache Memory Book".

In regards to claim 1, Spinney discloses a method comprising:

- receiving a unique key in column 14 line 6;

- searching a hash for a match to the unique key in column 14 lines 6-8 and 11-15;

- searching a CAM for the match to the unique key concurrently with the searching the hash for the match to the unique key in column 14 lines 6-11; and

- obtaining information regarding the unique key in figure 8 element 96.

Spinney does not disclose that the second structure used to perform a search is a cache. Handy discloses that a cache is the combination of an address mapper (such as a CAM) and a storage structure (such as Spinney's translation table, element 94 of figure 8) on page 16 and in figure 1.8. While Spinney does not refer to the use of a cache for the search of a unique key, one of ordinary skill in the art would recognize that the combination of Spinney's CAM and translation table comprises the functional equivalent of a cache, therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use a cache as the second structure to search for a unique key.

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In regards to claim 2, Spinney discloses the unique key is associated with a subscriber of a data packet in column 14 lines 6-9.

In regards to claim 3, Spinney discloses the hash comprises buckets, each bucket comprising a plurality of locations in figure 8 elements 89 and 90.

In regards to claim 61, Spinney discloses an apparatus comprising:

means for receiving a unique key in column 14 line 6;

means for searching a hash for a match to the unique key in column 14 lines 6-8 and 11-15;

means for searching a CAM for the match to the unique key concurrently with searching the hash for the match to the unique key in column 14 lines 6-11; and

means for obtaining information regarding the unique key in figure 8 element 96.

Spinney does not disclose that the second structure used to perform a search is a cache. Handy discloses that a cache is the combination of an address mapper (such as a CAM) and a storage structure (such as Spinney's translation table, element 94 of figure 8) on page 16 and in figure 1.8. While Spinney does not refer to the use of a cache for the search of a unique key, one of ordinary skill in the art would recognize that the combination of Spinney's CAM and translation table comprises the functional equivalent of a cache, therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use a cache as the second structure to search for a unique key.

In regards to claim 62, Spinney discloses the hash comprises buckets, each bucket comprising a plurality of locations in figure 8 elements 89 and 90.

In regards to claim 65, Spinney discloses a machine-readable medium that provides instructions, which when executed by a machine, cause the machine to perform operations comprising:

- receiving a unique key in column 14 line 6;
- searching a hash for a match to the unique key in column 14 lines 6-8 and 11-15;
- searching a cache for the match to the unique key concurrently with the searching the hash for the match to the unique key in column 14 lines 6-11; and
- obtaining information regarding the unique key in figure 8 element 96.

Spinney does not disclose that the second structure used to perform a search is a cache. Handy discloses that a cache is the combination of an address mapper (such as a CAM) and a storage structure (such as Spinney's translation table, element 94 of figure 8) on page 16 and in figure 1.8. While Spinney does not refer to the use of a cache for the search of a unique key, one of ordinary skill in the art would recognize that the combination of Spinney's CAM and translation table comprises the functional equivalent of a cache, therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use a cache as the second structure to search for a unique key.

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In regards to claim 66, Spinney discloses the hash comprises buckets, each bucket comprising a plurality of locations in figure 8 elements 89 and 90.

Allowable Subject Matter

Claims 4-7, 10-14, 17, 18, 24-37, 63-64, 67-68 and 71 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 38-60 are allowed.

The following is a statement of reasons for the indication of allowable subject matter:

In regards to claim 38, none of the prior art discloses a hash comprised of a bucket with a plurality of locations to store a unique key, a cache to store least recently used unique keys, and searching the hash and cache concurrently to find a unique key, in combination with the other specified claim limitations.

Spinney, US Patent 5,414,704, Tamura et al., US Patent 5,359,720, and Bronstein et al., US Patent 6,735,670, represent the closest available are of record, all three prior art disclose using a hash and a content addressable memory structure (a CAM or a cache) to store data and searching both structures for a stored data, however none of these prior art establish that the cache stores least recently used keys with

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respect to the hash. For this reason, independent claim 38 is found allowable over the prior art of record.

Claims 39-43 are found allowable as being dependent upon allowed claim 38.

In regards to claim 44, none of the prior art discloses a line card comprising a first memory storing a plurality of most recently used keys, a second memory storing a plurality of least recently used keys with respect to the most recently used keys, and a processor to search both memories concurrently to find a matching key in combination with the other specified claim limitations.

Spinney, US Patent 5,414,704, Tamura et al., US Patent 5,359,720, and Bronstein et al., US Patent 6,735,670, represent the closest available art of record, all three prior art disclose using a hash and a content addressable memory structure (a CAM or a cache) to store data and searching both structures for a stored data, however none of these prior art establish that the cache stores least recently used keys with respect to the hash. For this reason, independent claim 38 is found allowable over the prior art of record.

Claims 45-60 are found allowable as being dependent upon allowed claim 44.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul A Baker whose telephone number is (571)272-4203. The examiner can normally be reached on M-F 10am-6:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mano Padmanabhan can be reached on (571)272-4210. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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3/16/05

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